

Application Note

MLH Series Heavy Duty Pressure Transducer in Oil and Gas Plunger Lift Systems

BACKGROUND

Plunger lift systems are used in the extraction of oil and gas in aging production wells (see Figure 1) in which gas pressure in the casing and tubing pushes a steel plunger and the column of fluid above it to the surface for delivery to the sales flow line.

The operation of a plunger lift system relies on the build up of pressure in the well when the well is shut-in (not producing). The well shut-in pressure must be sufficiently higher than the sales flow line pressure to lift the load to the surface. A valve mechanism, controlled by a microprocessor, regulates gas input to the casing providing automated control of the process. Accurate differential pressure between the casing and tubing pressures is essential to efficient operation of the well. Since these wells are normally located in remote locations without access to electricity, the microprocessor controller is commonly powered by batteries which are recharged by solar panels.

PROCESS STEPS OF PLUNGER LIFT SYSTEM

(See Figure 2 on page 2.)

1. Gravity pulls the plunger down the casing until it comes to rest on the spring stop at the bottom of the well. Oil or gas flowing out of the sales flow line causes liquids to accumulate in the well bore, creating a gradual increase in back pressure slowing production.
2. To reverse the decline in production, the well is placed in a shut-in state by the controller causing well pressure to increase as a large volume of high pressure gas accumulates in the annulus between the casing and tubing. Once a sufficient volume of gas and pressure is reached, the plunger and liquid load above it are pushed to the surface.
3. The plunger travels to its highest point in the casing, sensed by the arrival sensor and captured in place.
4. The production oil and gas exits through the sales flow line.
5. Once the production flow has stabilized, the controller signals for the plunger to be released where it slides back down to the bottom of the well and the cycle repeats itself.

(Source: Environmental Protection Agency:
http://www.epa.gov/gasstar/documents/ll_plungerlift.pdf)

Figure 1. Production Well



CUSTOMER NEEDS

- Optimization of well production
- Accurate pressure monitoring of tubing, casing, and flow line pressures
- Rugged pressure transducer with media isolating features
- Quick disconnect electrical connector
- Steel pressure ports and wetted surfaces for process connection and media compatibility

HONEYWELL SOLUTIONS

There are three possible uses for the MLH Series Heavy Duty Pressure Transducer in this application (See Figure 2). For use in potential oil and gas plunger lift system applications where intrinsically safe, Class 1 Div 1, etc. agency approvals/certifications are not required.

1. Tubing Pressure Transducer – Gas pressure in the well tubing is the ‘motor’ that lifts the plunger and the production fluid above it. This gas pressure is built up when the well is in a ‘shut-in’ state and is sensed by the MLH Series. When sufficient tubing pressure is sensed as a differential to the casing pressure, the controller signals the main well valve to open, causing plunger lift and production flow. Conversely, when the tubing casing pressure reaches a minimum threshold against casing pressure, the controller signals the main valve to close and the cycle repeats. The MLH Series provides a signal to the controller proportional to the applied tubing pressure which is used in conjunction with the casing pressure and algorithms within the controller to operate the well for maximum and efficient system operation.
2. Casing Pressure Transducer – The MLH Series monitors the formation pressure of the casing, which is used in conjunction with the tubing pressure and algorithms within the controller to operate the well for maximum production.
3. Flow Line Pressure Transducer – The MLH Series monitors the flow line pressure (sometimes called sales line). Its signal is sent to the controller to monitor for optimum production flow and, in conjunction with the casing to tubing differential pressure, used to signal the start of a ‘shut-in’ or open cycle. Used in conjunction with tubing pressure, casing pressure, and the algorithms within the controller, the MLH Series provides accurate signals to operate the well for maximum and efficient production.

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Value Propositions

- **Enhances production:** Monitors the formation pressure of the casing, enhancing production
- **Cost-effective:** Amplified outputs eliminate cost of external amplifiers
- **Safety:** Input reverse voltage protection and output short circuit protection guard against mis-wiring
- **Fast:** Less than 2 ms response time provides accurate, high-speed measurement
- **Durable:** IP65 or better rating allows use of the device in many harsh environments
- **Efficient system operation:** Provides a signal to the controller proportional to the applied tubing pressure which is used in conjunction with the casing pressure and algorithms within the controller to operate the well for maximum and efficient system operation.
- **Flexible:** All-metal wetted parts allows for use in a wide variety of fluid applications, increasing application flexibility

Figure 2. Products that may be used in this application

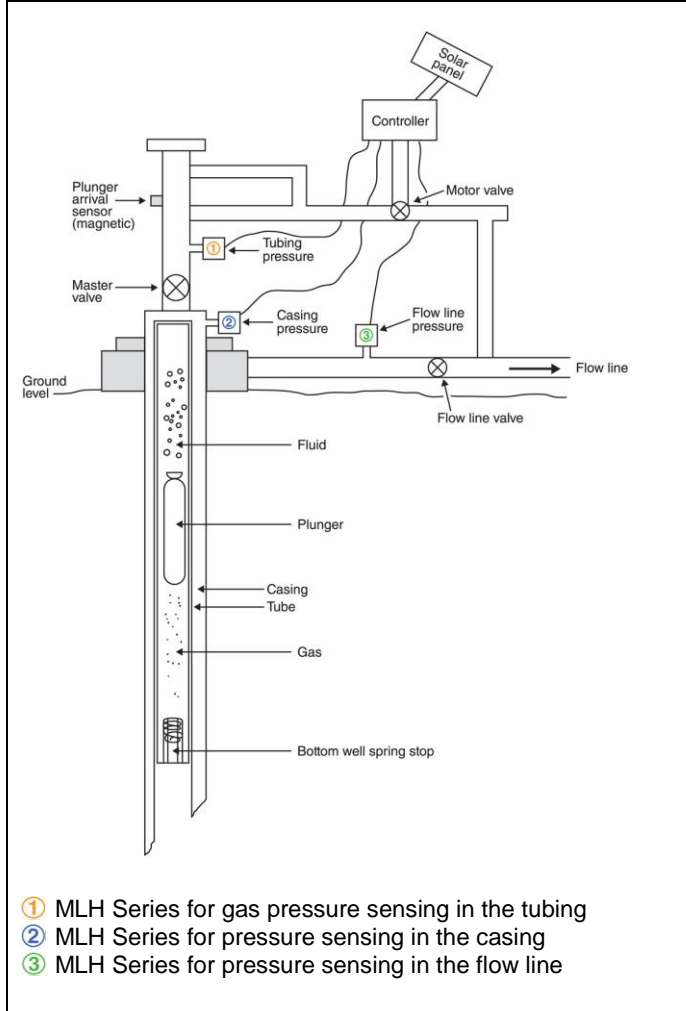


Table 1. MLH Series Heavy Duty Pressure Transducer

All metal pressure transducer, sealed gage, amplified, 0 psi to 1,000 psi pressure range, 1/4-18 NPT port style, 0.5 Vdc to 4.5 Vdc ratiometric output type, quick disconnect electrical connector. For use in potential oil and gas plunger lift system applications where intrinsically safe, Class 1 Div 1, etc. agency approvals/certifications are not required.



Feature	Benefit
All-metal wetted parts	Allows for use in a wide variety of fluid applications
No internal elastomeric seals	Eliminates o-ring compatibility issues
Amplified outputs	Eliminates cost of external amplifiers
Input reverse voltage and output short circuit protections	Guards against mis-wiring
Less than 2 ms response time	Provides high-speed measurement
Rated IP65 or better	Allows for use in many harsh environments
Ratiometric	Industry standard output accepted worldwide by most customers' electronic control interface modules

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this application note is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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